

-2-

disclosure is as follows: "with silver cation or copper cation present at some or all of the exchangeable cationic sites." (OA, page 2, emphasis in original) The Examiner further stated that Applicant was required to cancel the "new matter" in reply to the OA.

Applicants respectfully take issue with the Examiner's characterization of the cited language as "new matter." As pointed out in the previous amendment, the recitation "at some" from the above quote was taken verbatim from U.S. Serial No. 09/179,667 (which had been incorporated by reference, and is now U.S. Patent No. 6,215,037) at page 3, line 34 of that specification as originally filed.

As such, it is submitted that the recitation of "at some" in the cited language was fully supported by the instant specification as filed. Thus, Applicants submit that the objection under 35 USC 132 has been traversed and overcome, withdrawal of which is respectfully requested.

Claims 34-64 stand rejected under 35 U.S.C. 112, first paragraph since the Examiner asserts that the recitation "with silver cation or copper cation present at some or all of the exchangeable cationic sites" (OA, pages 2-3, emphasis in original) in claims 34, 48 and 55 was not described in the present specification or copending incorporated-by-reference applications. Given the traversal of the 35 USC 132 objection immediately above, it is submitted that the 112, first paragraph rejection is improper, withdrawal of which is respectfully requested. It is further submitted that claims 34-64 are allowable, as there were no rejections of these claims over any prior art.

Claims 1-7, 10-14, 33 and 65 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Ogawa et al. (6,042,797) in view of "New Sorbents for Olefin/paraffin separations by adsorption..." Ralph T. Yang and E.E. Kikkinides, AIChE Journal, March 1995, Vol. 41, No. 3, pp. 509-517. (Yang)

The Examiner states that Ogawa discloses a process for removing ethylene from a gas mixture containing ethylene and a sulfur compound (e.g., sulfur oxide) by contacting the gas mixture with an adsorbent which comprises a silver compound (silver nitrate) and zeolite. The Examiner recognizes that Ogawa does not

-3-

specifically disclose that the carrier comprises a monolayer of a silver compound on the adsorbent surface. However, he stated that it is optional that only silver compound is impregnated on the adsorbent (Applicants do not see this in Ogawa). [?] ① Therefore, the Examiner concluded that this limitation is embraced by the reference (Applicants respectfully take issue with this conclusion). The Examiner also recognized that the reference does not disclose that the retaining of the alkene is accomplished by formation of π -complexation bonds. However, it is known that the bonds between the silver compound and alkene occur by π -complexation bonds (See col. 2, line 59 through col. 8, line 7) (Applicants also take issue with this statement--the cite from Ogawa is not discussing π -complexation).

The Examiner notes that Ogawa does not disclose that the sulfur compound is hydrogen sulfide, does not disclose that silver compound is dispersed on the adsorbent, and does not disclose the silver compound is silver halide and the carrier is silica which has a surface area between 50 to 2,000 m²/g.

The Examiner states that Yang 1995 discloses a process for separating ethylene/propylene from a paraffinic feed. The Examiner erroneously asserts that the Yang 1995 adsorbent comprises a silica support and silver salt (e.g., AgNO₃, AgCl).

In contrast, Applicants submit that the 1995 reference actually discloses the use of AgNO₃ to prepare either 1) silver exchanged zeolites; or 2) silver exchanged resins; however, nowhere in the reference is silver taught or suggested for use with a silica support. The reference then teaches 3) monolayer dispersion of CuCl on alumina. Silica is not disclosed in the Yang 1995 reference. ②

The Examiner concluded that it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the Ogawa process by using a feedstock which contains a "tiny small amount (e.g. 0.01 ppm) of hydrogen sulfide because such small amount of hydrogen sulfide in the feed would" [Applicants assume the following was the Examiner's intent, however, the rest of the sentence following the above quote was unintelligible] be tolerated by the adsorbent and would not affect the outcome of the Ogawa process. Further, the Examiner stated that it would have been obvious to disperse the silver compound on

-4-

the carrier as taught by Yang (as stated above, Applicants take issue with this interpretation of Yang 1995) because Yang discloses that it is effective to remove alkene when using an adsorbent wherein a silver compound is dispersed on the adsorbent.

Claims 8, 9, 29 and 30 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 1-7 and 10-14 above, and further in view of Ramachandran et al. (5,744,687).

Claims 27, 28 and 32 stand rejected under 35 U.S.C. 103(b) as being unpatentable over Milton (2,882,243). The Examiner stated that it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the Milton process by utilizing a feedstock containing a tiny amount of hydrogen sulfide (e.g., 0.01 ppm) because it would be expected that the tiny amount of hydrogen sulfide present in the feedstock of Milton would not affect the outcome of the process of Milton.

Applicants do not acquiesce to the Examiner's conclusion, as it begs the issue, and is also not practical. As stated in Applicants' application at page 3, lines 5-10:

[I]n catalytic reforming, the catalyst used is often platinum supported on high-purity alumina. However, the platinum on the catalyst is seriously deactivated by sulfur compounds, and therefore the feedstock is desulfurized to less than 3 ppm by weight of sulfur before the reforming.

In order to preserve the expensive platinum in a catalytic reforming process, the desulfurization is taken substantially to the limits--in other processes, one would generally not see feedstocks having as low as 3 ppm hydrogen sulfide. As such, it would be extremely expensive and time consuming, if not impossible, to desulfurize feedstock to a level of "0.01 ppm" as suggested by the Examiner.

Discussion

Applicants' invention as defined in claims 1, 11, 15, 29, 30, 32, 34, 48 and 55 is predicated on the fact that it is not necessary to desulfurize to extremely low levels:

[T]his novel adsorbent fortuitously and unexpectedly substantially maintains its adsorbent capacity and preference for the alkene in the

-5-

presence of the sulfur compound. This is highly desirable, as this sulfur tolerant and/or resistant adsorbent (as well as the other novel adsorbents described hereinbelow) **obviates step(s) conventionally necessary to desulfurize the cracked gas stream(s).** (emphasis added) page 10, lines 28-36

The Examiner is further directed to the instant application at page 13, lines 13-22:

The novel adsorbents were exposed to very severe amounts, for example the hydrogen sulfide was present in amounts up to about 66 mole%. **In sharp contrast, a conventional cracked gas stream before any desulfurizing distillation steps contains hydrogen sulfide present in amounts of about 0.01 mole% [100 ppm].** As such, the data presented hereinbelow indicate that the novel adsorbents of the present invention would be quite robust, ie. very tolerant and/or resistant to H₂S under normal operating conditions. (emphasis added)

Applicants reiterate from the last amendment that Ogawa does not teach or suggest a gas containing hydrogen sulfide, and should thus be removed as a primary reference. Ogawa states at Col. 6, lines 24 et seq.:

Specifically, [the gas] may be a gas containing ethylene, for example, the atmosphere, an exhaust gas, or a gas in a storage chamber of the crops. The adsorbent is effective also in a case where the gas contains not only ethylene but also carbon monoxide, carbon dioxide, hydrogen, oxygen, nitrogen oxide, sulfur oxide. . .

In Ogawa, the olefins are being removed from the atmosphere or an exhaust gas. Exhaust gas contains by-products of burning: sulfur oxides, carbon oxides, etc. In Applicant's invention as defined in claims 1 and 11, it is recited that the adsorbent substantially maintains its adsorbent capacity and preference for the alkene in the presence of hydrogen sulfide. This is remarkable in that hydrogen sulfide has been recognized as being capable of potentially deactivating entire adsorbents. **Thus, hydrogen sulfide has been recognized as reacting detrimentally; whereas sulfur oxide is substantially an inert by-product.**

Neither Ogawa nor any of the other cited references disclose adsorbents which substantially maintain their adsorbent capacity and preference for the alkene in the presence of hydrogen sulfide as recited in Applicants' claims 1 and 11. As such, it is submitted that Applicants invention as defined in claims 1 and 11, as well as in all claims dependent therefrom, is not anticipated, taught or rendered

-6-

obvious by Ogawa or Yang 1995, either alone or in combination, and patentably defines over the art of record.

Applicants submit that the recitation in claims 29, 30 and 32 of hydrogen sulfide present in amounts up to about 66 mole% renders these claims and any dependent therefrom allowable. None of the cited references teach or suggest adsorbents which can function in an atmosphere having up to about 66 mole% hydrogen sulfide present (as stated above, in fact they do not even mention hydrogen sulfide). As such, it is submitted that claims 27, 28, 29, 30 and 32 are in condition for allowance.

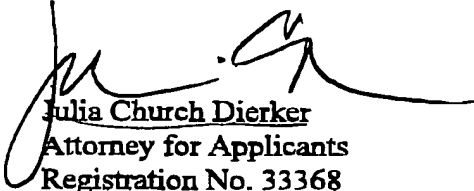
For all the above reasons, it is submitted that Applicants' invention as defined in claims 1-25 and 27-65 is not anticipated, taught or rendered obvious by any of the cited references, and patentably defines over the art of record.

In summary, Claims 1-25 and 27-65 remain in the application. It is submitted that, through this amendment, Applicants' invention as set forth in these claims is now in a condition suitable for allowance.

Further and favorable consideration is requested. If the Examiner believes it would expedite prosecution of the above-identified application, he is cordially invited to contact Applicants' Attorney at the below-listed telephone number.

Respectfully submitted,

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